

DOCKET NO: 273621US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
JUERGEN SCHMIDT-THUEMMES, ET AL. : EXAMINER: BERNSHTEYN, M.
SERIAL NO: 10/541,206 :
FILED: JULY 5, 2005 : GROUP ART UNIT: 1796
FOR: METHOD FOR PRODUCING :
STABLE AQUEOUS POLYMER
DISPERSIONS BASED ON
CONJUGATED ALIPHATIC DIENES
AND VINYL AROMATIC COMPOUNDS

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Responsive to the Advisory Action of December 17, 2008 and the Office Action of September 3, 2008, and further to the Notice of Appeal submitted concurrently herewith, Appellants request review of the rejections in the above-identified application by the Board of Patent Appeals and Interferences.

I. REAL PARTY IN INTEREST

The real party in interest is BASF SE of Ludwigshafen, Germany.

II. RELATED APPEALS AND INTERFERENCES

No appeals or interferences which may directly effect the Board's decision in the present appeal are believed to exist.

III. STATUS OF THE CLAIMS

Claims 1-12 are pending claims. The rejection of Claims 1-12 is appealed.

IV. STATUS OF THE AMENDMENTS

The amendment filed on May 30, 2008 was entered and considered. The Request for Reconsideration filed on December 3, 2008 was considered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Claims 1 and 9 are drawn to processes for preparing an aqueous copolymer dispersion that includes carrying out a free-radically initiated aqueous emulsion polymerization. The polymerization is carried out on an aqueous emulsion that contains (a) conjugated aliphatic dienes, (b) vinylaromatic compounds, and (c) ethylenically unsaturated carboxylic acids and/or dicarboxylic acids. The conjugated aliphatic dienes are described on page 2, lines 23-24. The vinyl aromatic compounds are described on page 2, lines 24-25. The ethylenically unsaturated carboxylic acids and/or dicarboxylic acids are described on page 2, lines 25-28. The free radically initiated aqueous emulsion polymerization is carried out in the presence of an emulsifier that may be at least one of a sulfuric monoester of an ethoxylated fatty acid alcohol and a salt of an ester of an alkylpolyoxyethylenesulfosuccinate. The emulsifiers are described on page 2, line 37 through page 3, line 23. The aqueous emulsion polymerization must be carried out by adding certain amounts (i.e., 15-85% by weight) of the total emulsifiers within the period of time required to obtain total conversion of the monomer species (see page 4, lines 14-36). From 1 to 50% of the carboxylic acid groups of the ethylenically unsaturated (di)carboxylic acid monomer present in the aqueous emulsion must be neutralized by the addition of a base before polymerization (see page 4, line 38 through page 5, line 4).

Claim 2 recites supplying the monomer species to a polymerization reactor using a common supply line (see page 5, lines 6-9).

Claim 3 recites mixing of the monomer units as they are supplied to a polymerization reactor (see page 5, lines 6-9).

Claim 4 requires that the monomers of Claim 3 are mixed with water using one of the mixers recited in the claim (see page 5, lines 11-19).

Claim 5 recites a process in which both the monomers and an agent used to at least partially neutralize the carboxylic acid groups in the monomer mixture are supplied by a common supply line (see page 5, lines 6-9).

Claim 6 requires that a neutralizing agent and the monomer mixture are metered into a common supply line upstream of a mixing means (see page 6, lines 10-17).

Claim 7 requires the inclusion of a polymer seed during the aqueous emulsion polymerization (see page 6, lines 27-31).

Claims 8 and 10 require that the polymer seed and other components of the aqueous emulsion are added to a polymerization reactor before polymerization is initiated (see page 7, lines 21-34).

Claims 11 and 12 recite monomer mixture described in the Examples of the specification.

VI. GROUND'S OF REJECTION

A. Claims 1-8 are rejected as obvious under the meaning 35 U.S.C. § 103(a) over Ostrowicki (U.S. 5,910,534) in combination with Basu (U.S. 4,458,057).

The Office asserts that Ostrowicki discloses all of the features of Claims 1-8 except for the partial neutralization of ethylenically unsaturated carboxylic acids and/or dicarboxylic acids prior to polymerization (see paragraph no. 2 on pages 3-4 of the March 19, 2008 Office Action and page 2, paragraph no. 6 of the September 3, 2008 Office Action). The Office

relies on Basu as evidence that one of skill in the art would partially neutralize a reaction medium prior to the start of the polymerization reaction (see pages 4-5 of the March 19, 2008 Office Action and page 2, paragraph no. 6 of the September 3, 2008 Office Action).

B. Claims 9-12 are rejected as obvious under the meaning 35 U.S.C. § 103(a) over Ostrowicki, in combination with Kimura (U.S. 4,985,514) or Egraz (U.S. 6,184,321).

The Office asserts that Ostrowicki discloses all of the features of Claim 9 except for the partial neutralization of ethylenically unsaturated carboxylic acids and/or dicarboxylic acids prior to polymerization (see paragraph no. 7 on pages 2-4 of the September 3, 2008 Office Action). The Office relies on Kimura and Egraz as evidence that it would be obvious to neutralize a portion of acid group-containing monomers in advance of polymerization and/or carry out pre-neutralization of acrylic acid mixtures prior to polymerization (see page 4 of the September 3, 2008 Office Action).

VII. ARGUMENTS

A-1. The Office's failure to give patentable weight to Applicants' factual evidence is legal error meriting withdrawal of the rejections under 35 U.S.C. §103.

At the outset it should be noted that the present specification describes the undesirable characteristics of the process of the cited art (i.e., Ostrowicki) on page 1, lines 34-45. Appellants disclosed in the original specification that Ostrowicki suffers from the severe disadvantage of forming coagulum which must be separated in an expensive and time-consuming filtration operation.

Moreover, Appellants provided a side-by-side comparison of the claimed invention with the closest prior art (i.e., Ostrowicki) in the original specification. Appellants have shown that the presently claimed invention is substantially superior in comparison to the process of Ostrowicki as evidenced by a reduction in coagulum formation. The Office failed to give Appellants' factual evidence sufficient weight when determining patentability.

Example 1 of the present specification is carried out according to the claimed invention, e.g., by at least partial neutralizing a monomer mixture before subjecting the monomer mixture to polymerization (see lines 18-20 of Claim 1). This is evident from page 9, lines 18-22 of the specification where it is disclosed that Feeds I, II, and III were supplied to the polymerization reactor via a common supply line. Feed I includes a 25% strength by weight aqueous solution of sodium hydroxide (e.g., a base that neutralizes acids). Feed II contains a monomer mixture that includes acrylic acid (e.g., a monomer that contains a neutralizable acid group). Feed III contains a further monomer. At least partial neutralization of the carboxylic acid groups of the acrylic acid monomer must occur before any polymerization takes place in Example 1 because the acrylic acid from Feed II is mixed with the sodium hydroxide of Feed I prior to entry into the polymerization reactor.

This may be compared with the Comparative Example on page 10 of the present specification. The Comparative Example differs from inventive Example 1 discussed above in that Feed I was supplied to the reactor “via a feed line at the top” of the reactor and Feeds II, III and IV are fed to the polymerization reactor in a common feed line at the floor of the polymerization reactor. The consequence of feeding Feeds I and Feeds II-IV in separate feed lines is that the base (i.e., sodium hydroxide) is not mixed with the acrylic acid until after both have been fed into the polymerization reactor in which polymerization takes place. Thus, the carboxylic acid group-containing monomer (acrylic acid) cannot be neutralized prior to polymerization as required by present Claim 1.

The inventive and comparative examples of the present specification isolate the effect of at least partial neutralization prior to polymerization from any other effects because the Comparative Example is carried out like inventive Example 1 except that the acrylic acid monomer is fed to the reactor separately from the sodium hydroxide, e.g., without neutralization prior to polymerization.

Inventive Example 1 forms substantially less coagulum in comparison to the Comparative Example. Inventive Example 1 forms 80 gram of fine coagulum whereas the Comparative Example forms 890 gram of fine coagulum (see page 9, lines 37-38 and page 10, lines 27-28, respectively). The invention thus provides a 90% reduction in fine coagulum. Not only is the absolute amount of fine coagulum reduced, the amount of coagulum present in the filtered copolymer suspension is likewise reduced, for example, compare 105 ppm of fine coagulum (see page 9, lines 37-40) in the filtered composition of inventive example with 165 ppm of fine coagulum in the filtered composition of the Comparative Example (see page 10, lines 28-31).

Appellants submit that the data of the original specification demonstrate that at least partially neutralizing the acid group-containing monomer prior to polymerization is critical to obtaining a substantial reduction of coagulum.

The comparison provided in the original specification is a side-by-side comparison with the closest prior art, i.e., Ostrowicki, as evidenced by, for example, Example 3 in column 9 of Ostrowicki which uses essentially the same emulsifiers, monomer mixtures and initiators. Example 3 of Ostrowicki differs by neutralizing the carboxylic acid groups of a monomer “during the emulsion polymerization” (see the Abstract of Ostrowicki).

Appellants submit that the side-by-side comparison of the original specification is sufficient to rebut the Office’s assertion of obviousness and thus the rejection of Claims 1-8 as obvious over Ostrowicki should be overturned.

A-2. The Office’s assertion that the examples of Ostrowicki “do not contain any coagulum” (see lines 10-11 of the Continuation Sheet of the December 17, 2008 Advisory Action) is factually incorrect and thus the rejection should be withdrawn.

The Office states that Ostrowicki’s disclosure of examples which are “free of reaction vessel deposits” is evidence that no coagulum is formed in the Ostrowicki examples (see lines

9-12 of the Continuation Sheet of the December 17, 2008 Advisory Action). The Office's mischaracterization of Ostrowicki is further evidence the rejection is not supportable and should be withdrawn.

Applicants point out that the Office's characterization of the Ostrowicki examples is incorrect for at least two reasons: (i) the Office mischaracterizes "deposits" as coagulum, and (ii) the Office ignores disclosure in Ostrowicki proving that the Ostrowicki examples form substantial amounts of coagulum.

With regard to point (i), there is no evidence of record that the "reaction vessel deposits" described in Ostrowicki are coagulum. In contrast, Ostrowicki separately describes deposits and "coagulate" in the tables describing the Ostrowicki examples. The Office's assertion that absence of reaction vessel deposits proves that no coagulum is formed is factually not correct and is contrary to the explicit disclosure of the cited art.

With regard to point (ii), each of the tables describing the Ostrowicki examples show that, contrary to the Office's assertion, substantial amounts of coagulate are formed in the Ostrowicki process (see, for example, the table titled Example 3 in column 9 of Ostrowicki, the last two rows from the bottom separately describe "deposits in vessel" and "coagulate"). The Office's assertion that the examples of Ostrowicki "do not contain any coagulum" is thus factually incorrect.

The Office's assertion that Appellants' examples of the original specification do not show any unexpected result is not supportable in view of the evidence of record and further in view of the Office's erroneous characterization of the Ostrowicki disclosure.

The rejection of Claims 1-8 as obvious over Ostrowicki should thus be overturned.

B-1. The rejection of Claims 9-12 as obvious over Ostrowicki in combination with Kimura or Egraz should be withdrawn in view of Appellants' showing that partial

neutralization of a monomer mixture prior to polymerization provides a product having substantially reduced coagulum.

As discussed above in detail in Argument A-1, the examples of the original specification prove that at least partially neutralizing the carboxylic acid group-containing monomers prior to polymerization provides a substantial reduction in coagulum in comparison to Ostrowicki. Appellants have demonstrated the criticality of this sequence of neutralization and polymerization. There is no evidence of record to support an assertion that one of ordinary skill in the art would have foreseen that a substantial reduction in the formation of coagulum is achievable by carrying out at least partial neutralization of carboxylic acid-containing monomer units prior to polymerization.

Appellants thus submit that the data of the original specification rebut any assertion of obviousness set forth by the Office and the rejections should therefore be overturned by the Board.

For the reasons stated above, Appellants urge the Board to overturn the rejections.

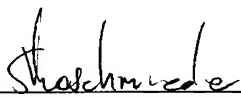
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VIII. CLAIMS APPENDIX

1. A process for preparing a stable aqueous copolymer dispersion comprising free-radically initiated aqueous emulsion polymerization of

- a) from 19.9 to 80 parts by weight of conjugated aliphatic dienes,
- b) from 19.9 to 80 parts by weight of vinylaromatic compounds,
- c) from 0.1 to 10 parts by weight of ethylenically unsaturated carboxylic acids and/or dicarboxylic acids,
- d) from 0 to 20 parts by weight of ethylenically unsaturated carbonitriles, and
- e) from 0 to 20 parts by weight of copolymerizable compounds other than monomers b),

the total amount of ethylenically unsaturated monomers a) to e) being 100 parts by weight, in the presence of water and from 0.1 to 5 parts by weight, based on the total monomer amount, of emulsifiers comprising

- f) sulfuric monoesters of ethoxylated fatty acid alcohols and/or
- g) salts of esters and monoesters of alkylpolyoxyethylenesulfosuccinates,

from 15 to 85% by weight of the total emulsifiers used being added within the time taken to reach up to 40% of the total conversion of the monomers a) to e), and from 1 to 50% of the carboxylic acid groups deriving from the monomers c) being neutralized by addition of base, wherein the partial neutralization of the monomers c) takes place before the polymerization.

2. The process as claimed in claim 1, wherein components a) to g) are supplied to the polymerization reactor during the polymerization via a common supply line.

3. The process as claimed in claim 2, wherein components a) to g) and at least part of the water are mixed to an emulsion by a mixing means during their supply.

4. The process as claimed in claim 3, wherein said mixing means comprises at least one static mixer, one dynamic mixer and/or one mixing nozzle.

5. The process as claimed in claim 2, wherein at least part of the base required for partial neutralization of the monomers c) is metered into the common supply line.

6. The process as claimed in claim 5, wherein at least part of the base required for partial neutralization of the monomers c) is metered into the common supply line upstream of the mixing means.

7. The process as claimed in claim 1, wherein the free-radically initiated aqueous emulsion polymerization is conducted in the presence of a polymer seed.

8. The process as claimed in claim 7, wherein at least part of the water and optionally parts of one or more of components a) to g) and also parts or all of a polymer seed or other customary additives are charged to the polymerization reactor and the remainders of these components are supplied to the liquid phase of the reaction mixture after the free-radical polymerization has been initiated.

9. A process for preparing a stable aqueous copolymer dispersion, comprising:
polymerizing, in a polymerization vessel, an aqueous monomer mixture by free radically initiated aqueous emulsion polymerization, wherein the aqueous monomer mixture comprises water and

- a) from 19.9 to 80 parts by weight of conjugated aliphatic diene monomer,
- b) from 19.9 to 80 parts by weight of vinylaromatic compound monomer,
- c) from 0.1 to 10 parts by weight of at least one of an ethylenically unsaturated carboxylic acid monomer and a dicarboxylic acid monomer,
- d) from 0 to 20 parts by weight of ethylenically unsaturated carbonitrile monomer,

and

- e) from 0 to 20 parts by weight of one or more copolymerizable compounds other than monomer b),

wherein the total amount of the ethylenically unsaturated monomers a)-e) is 100 parts by weight;

wherein the polymerizing is carried out in the presence of from 0.1 to 5 parts by weight of at least one emulsifier selected from the group consisting of

- f) a sulfuric monoester of an ethoxylated fatty acid alcohol, and
- g) a salt of an ester and a monoester of an alkylpolyoxyethylenesulfosuccinate;

wherein from 15 to 85% by weight of the total weight of the emulsifier is added to the polymerization vessel during the polymerizing and before more than 40% by weight of the total amount of the ethylenically unsaturated monomers a)-e) are polymerized; and

wherein, before the polymerizing, from 1 to 50% of the carboxylic acid groups of the monomer c) are neutralized by mixing with a base.

10. The process as claimed in claim 9, wherein the monomer c) is neutralized with the base before the monomer c) is added to the aqueous monomer mixture.

11. The process as claimed in claim 1, wherein the aqueous monomer mixture comprises styrene, acrylic acid, and butadiene.

12. The process as claimed in claim 9, wherein the aqueous monomer mixture comprises styrene, acrylic acid, and butadiene.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.